NOTES ON THE GENUS NAJAS (NAJADACEAE)[1]

ROBERT R. HAYNES and W. ALAN WENTZ

Department of Botany, The Ohio State University, Columbus, 43210
and School of Natural Resources, The University of Michigan,
Ann Arbor, 48104

Najas is a cosmopolitan genus of submersed aquatic plants with its greatest diversity in tropical and subtropical regions. Although floristic treatments have been prepared for certain areas, e.g., eastern United States (Clausen, 1936) and Panama (Wentz and Haynes, 1973), at no time since Rendle (1899) have all of the species, either worldwide or regional, been included in one revisionary treatment. Morphological variability within the group has been poorly understood. Because of the lack of a thorough revisionary treatment and a poor understanding of the taxa, the genus is, we feel, in need of revision. Therefore at the present time, we are revising *Najas* in the Western Hemisphere. During the preparation of this treatment, we recognized two species (*N. ancistrocarpa* Magnus and *N. wrightiana* A. Br.) previously unreported from North America and a new variety of *N. guadalupensis* (Spreng.) Magnus. These three taxa are discussed here.

Najas ancistrocarpa was first collected in the United States by A. H. Curtiss (*6865*) in "tidal creeks" near Milton (Santa Rosa County), Florida on 3 Aug 1901. Fernald (1902) reported these specimens as *N. conferta* A. Br. (a synonym of *N. wrightiana*) and distributed them to many herbaria (GA, GH, MO, NY, UC, US, WIS).

In 1947, R. F. Thorne collected *N. ancistrocarpa* from Open Pond (*5537*, GA) and Cane Water Pond (*5538*, GH, MO, UC) in Decatur County, Georgia. Thorne and W. C. Muenscher revisited the Milton, Florida location in 1948 and again collected the species (*8612a*, F, GA, GH, NY, US). All of the specimens collected by Thorne and Muenscher were identified as *N. conferta*.

Most recently, *N. ancistrocarpa* has been collected in Lake Jackson, Leon County, Florida (*Smith s.n.*, 1972, FSU, OS). This species should be sought in both fresh and brackish waters throughout the southeastern states.

The vegetative organs of *N. ancistrocarpa* resemble those of *N. minor* All. and *N. wrightiana* by the presence of large teeth scattered along the margin of quite narrow leaves. However, *N. ancistrocarpa* is easily distinguished from the last two species by its fruits being so recurved they appear crescent-shaped (Fig. 1). We know of no other *Najas* with such curved fruits.

Najas ancistrocarpa is native to Japan and, according to Miki (1935), has previously been known from only two Japanese islands, Honshiu and Shi-

---

[1] Contribution from the Department of Botany, The Ohio State University (Paper No. 863).

SIDA 5(4): 259—264. 1974.

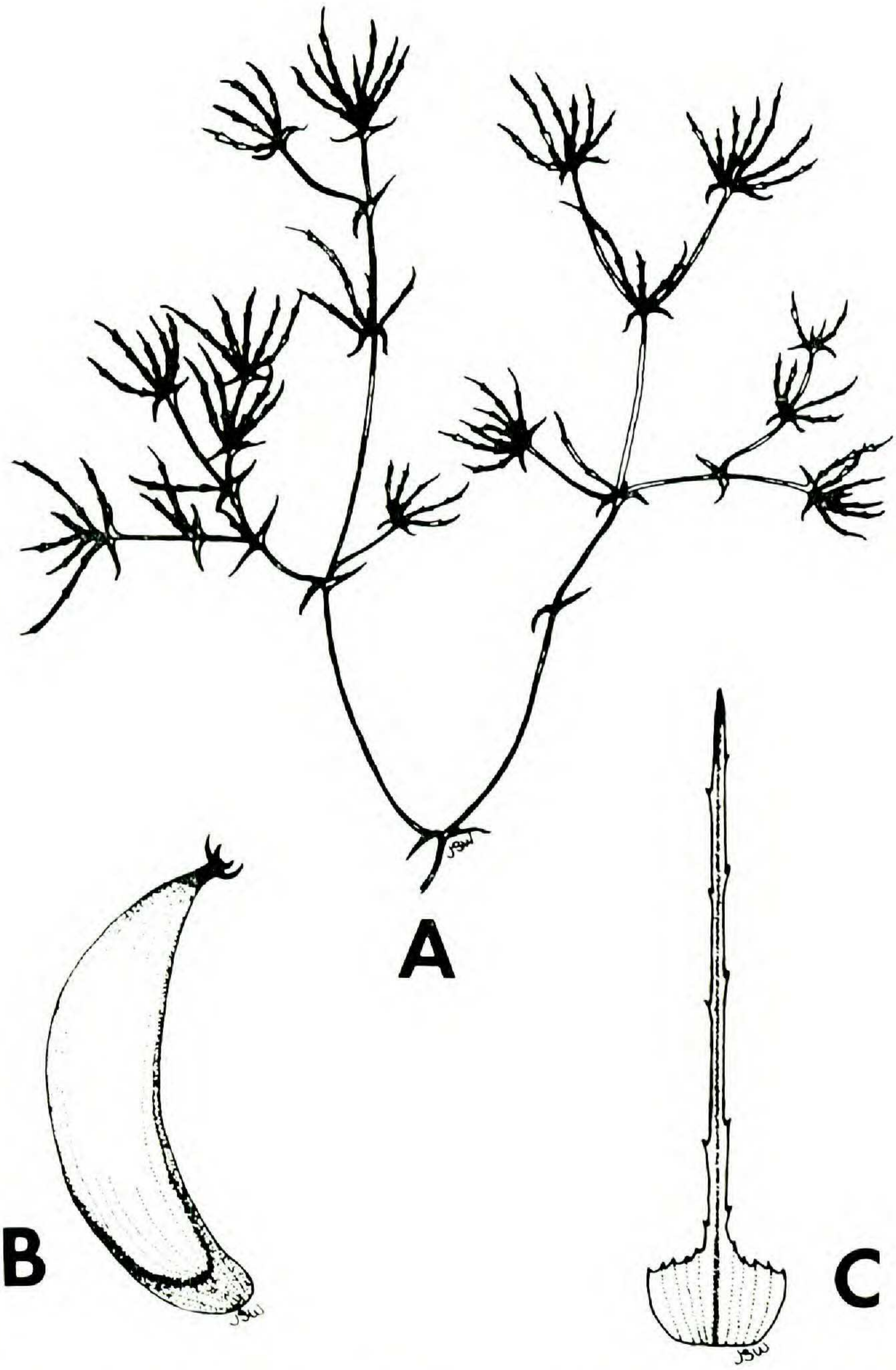

Fig. 1. *Najas ancistrocarpa.* A. Habit sketch (× 1); B. Fruit with involucre (× 9); C. Leaf (× 4½).

koku. In addition to *N. ancistrocarpa*, other species in the aquatic flora of southeastern United States, e.g. *Blyxa aubertii* and *Ottelia alismoides* (Thieret, Haynes, and Dike, 1969), are known to occur in isolated areas of North America and Eastern Asia.

A second species, *N. wrightiana*, has recently been found in the United States. Clausen (1946) gives the range of this species as "Cuba, the coastal plain of Mexico north of the Isthmus of Tehuantepec, and the Yucatan Peninsula." We have seen specimens from the Dominican Republic, Brazil,

Venezuela, Guatemala, and British Honduras. The species is probably widespread throughout the West Indies and Latin America.

Clausen (1946) recognized two subspecies based upon differences in leaf width and number of teeth along the leaf margin. We have examined numerous specimens from throughout the species' range and do not think the segregation of infraspecific taxa is warranted.

The first collections of *N. wrightiana* from the United States are from the Big Cypress Swamp in Collier County, Florida (*Lakela 27796*, "off Turner Road," 24 Oct 1964, FSU, USF; *Lakela 31526*, Remuda Ranch Estates, 30 Jul 1968, USF). The Florida collections of *N. wrightiana* apparently represent the northernmost localities for the species. The collections we have seen are abundantly fruiting, and it is likely that the species will spread throughout southern Florida.

Najas wrightiana is easily distinguished from other North American *Najas* by its large teeth scattered along the margin of quite narrow leaves, its short (1–1.5 mm) erect fruit with 5-angled areolae, and its bushy appearance due to axillary tufts of leaves and very short internodes (Fig. 2).

Variation in vegetative parts (plasticity) within individual taxa of aquatic plants has been recognized in *Callitriche* (Fassett, 1951), *Halodule* (Phillips, 1967), *Nymphaea* (Williams, 1970), *Najas minor* (Wentz and Stuckey, 1971), and *Potamogeton* (Haynes, 1973). These workers concluded that because of this plasticity, the taxonomy of the genera in question should rest primarily on reproductive characters. As a result of our own field work and the examination of several thousand specimens we conclude that much of the variability of *N. guadalupensis* is vegetative plasticity and not of genetic origin. Clausen (1936), Ooststroom (1939), and Wentz and Haynes (1973) discussed variability within *N. guadalupensis* and suggested that the complex should possibly be considered as several closely related species.

It is possible that some taxonomists might consider this variation worthy of taxonomic recognition at the varietal level. We, however, regard varieties as morphogeographic subdivisions of a species that presumably reflect genetic differences (Kapadia, 1963). Thus far, in *N. guadalupensis*, we have found a definite correlation between a morphological type and its geographic distribution only in a population in Florida. We have decided to consider the Florida population at the varietal level and not to give the other variants taxonomic rank. Clausen (1936) also mentioned that this population might be worthy of taxonomic recognition.

The nomenclature of *N. guadalupensis* is difficult to explain. The taxon was named as *Caulinia guadalupensis* by Sprengel (1825). The original specimen, subsequently deposited at Berlin, was destroyed during World War II (Gerloff, personal communication). We are uncertain which variety Sprengel had before him. However, having seen specimens of only one variety from Guadaloupe—(the type locality), we consider that taxon as the typical variety. Several other varietal names of *N. guadalupensis* have been proposed. We have examined specimens of these and consider them to be the

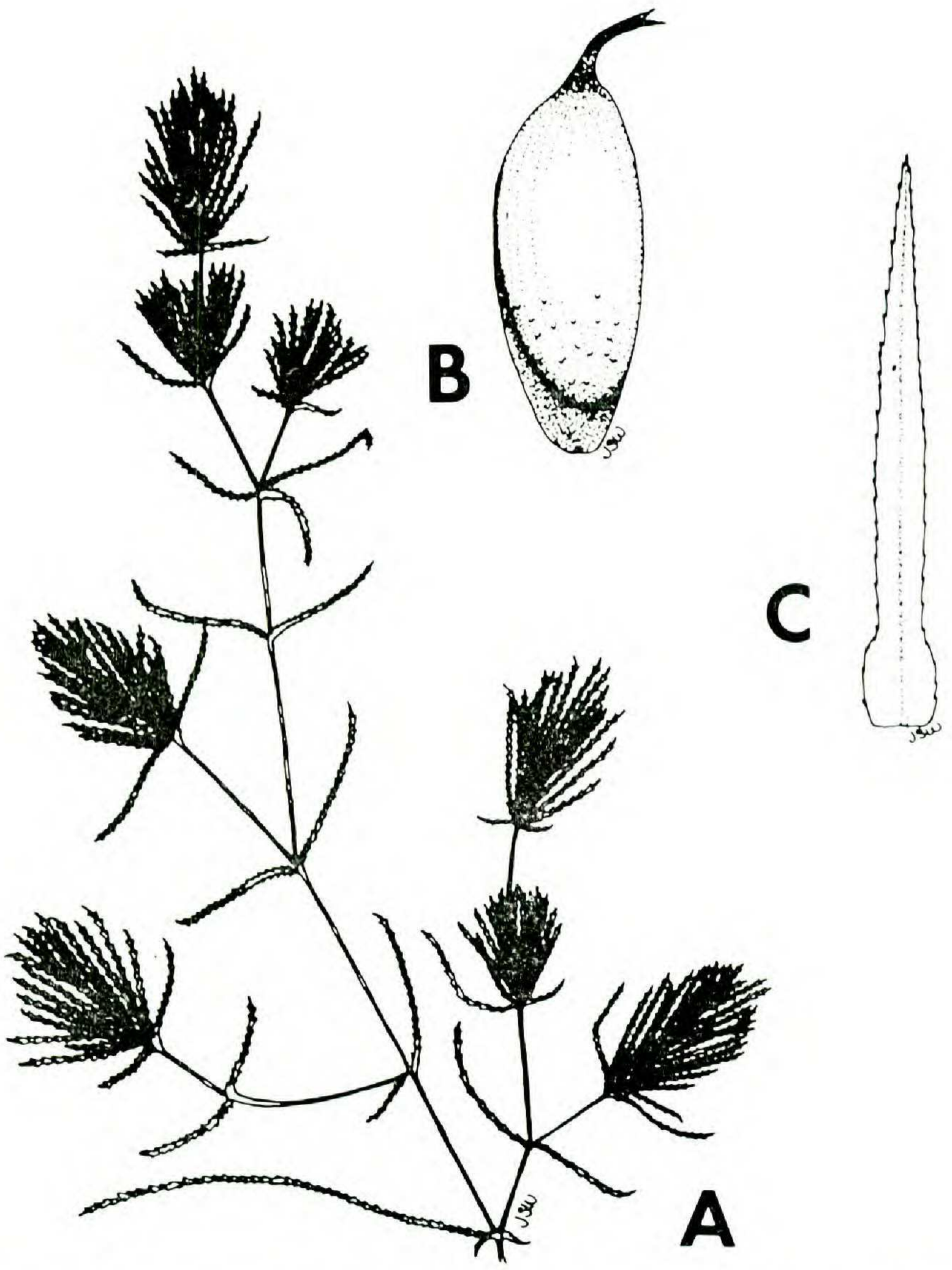

Fig. 2. *Najas wrightiana*. A. Habit sketch (× ¾); B. Fruit with involucre (× 25); C. Leaf (× 2½).

same taxon that occurs in Guadaloupe. Thus, the taxon limited to Florida has no varietal name. We therefore propose:

NAJAS GUADALUPENSIS (Sprengel) Magnus var. **floridana** Haynes & Wentz, var. nov.

Plantae glabrae, monoeciae. Caules 7–51 cm longi, 0.1–1.7 mm diametro, profuse ramosi, internodiis 0.1–9 cm longis. Folia 9–32.5 mm longa, divisa in laminas et auriculas. Laminae 0.5–2.1 mm latae, obtusae vel acuminatae apice, mucronatae; margines conspicuo serrulati, dentibus 18–42 unicellularibus, in uno latere; mucro dentibus lateralibus grandiore. Auriculae 1.2–2.5 mm latae, laminis latiores, rotundatae vel gradatim expansae prope basin, dentibus 5–8 in dimidio superiore quoque marginis, nullis prope basin; dentes similares sed illis laminarum grandiores. Flores solitari, staminati in axillis superis, carpellati in axillis interis; involucra ferruginea vel atro-

purpura, raro viridiba. Flores staminati, 1.5–2.4 mm longi; involucra abrupte angustata supra antheras in rostrum, 0.8–1.3 mm longa, apice lobis quatuor acutis; antherae 1–1.6 mm longae, 0.5–0.7 mm latae, theca una; filamenta demum 1–2.3 mm longa, basi dilatata. Flores carpelleti, 1–3.5 mm longi, fusiformes; involucra supra ovarium abrupte angustata in rostrum, 0.3–1.5 mm longa, findentia opposita carinae, apice lobis acutis tribus vel quatuor; styli usque ad 0.7 mm longi, lobis stigmaticis duobus, extendis supra rostrum involucrale. Fructus 1.6–2.2 mm longi, 0.3–0.8 mm lati, straminei vel perpallidi-viridi, fusiformes; costa una, basaliter complanata, carinata; areolae inconspicuae, latiores quam longae, usque ad 0.1 mm longae, usque 0.2 mm latae, quatuor vel quinque angulatae, circa 20 serialibus longitudinalibus; semina fusiformia, stramineus vel lignicolor, extremis fuscatis.

HOLOTYPE: UNITED STATES: FLORIDA: Dade Co.: abundant in brackish water of ditch along St. Rt. 94 (east end) off U.S. Rt. 41 at edge of Everglades National Park, ca. 40 miles W of Miami, 5 Apr 1972, *W.A. Wentz 670* (US!; isotypes, GH! MICH! OS!).

The new variety (Fig. 3) can be distinguished from the typical variety by its longer fruits (1.6–2.2 mm for var. *floridana* and less than 1.6 mm for var. *guadalupensis*). Also the leaves of the new variety at maturity are usually 2–3.5 cm long with 18–42 macroscopic teeth per side, while those of the typical variety are smaller and have about 100 minute teeth along each side.

Najas guadalupensis var. *floridana* is widely distributed in rivers, streams, and ponds throughout Florida and Georgia. It is especially common in the Big Cypress Swamp and the Everglades region of southern Florida.

ACKNOWLEDGEMENTS

We are grateful to Dr. Tod F. Stuessy for assistance with the Latin description; to Dr. David J. Keil and Mr. Marvin L. Roberts for reading the manuscript; to the curators of herbaria from which specimens were borrowed; to Mrs. Jan S. Wentz for the illustrations; and to Mr. Howard F. Schnepp who made it possible to conduct field work in Florida during April 1972.

REFERENCES

CLAUSEN, R. T. 1936. Studies in the genus *Najas* in the northern United States. Rhodora 38: 333-345.

———. 1946. *Najas arguta* in Central America and its relationship to *N. wrightiana*. Bull. Torrey Bot. Club 73: 363-365.

FASSETT, N. C. 1951. *Callitriche* in the New World. Rhodora 53: 137-155, 161-182, 185-194, 209-222.

FERNALD, M. L. 1902. Some little known plants from Florida and Georgia. Bot. Gaz. 33: 154-157.

HAYNES, R. R. 1973. A revision of North American *Potamogeton* subsection *Pusilli* (Potamogetonaceae). Ph. D. Dissertation. The Ohio State University. 140 p.

KAPADIA, Z. J. 1963. Varietas and subspecies: a suggestion towards greater uniformity. Taxon 12: 257-259.

MIKI, S. 1935. New water plants in Asia Orientalis II. Bot. Mag. (Tokyo) 49: 687-693.

OOSTSTROOM, S. J. van. 1939. Some notes on a collection of aquatic phanerogams from the Netherlands, West Indies Islands, and from Venezuela and Columbia. Recueil Trav. Bot. Néerl. 36: 705-708.

PHILLIPS, R. C. 1967. On species of the seagrass, *Halodule*, in Florida. Bull. Mar. Sci. Gulf Caribbean 17: 672-676.
RENDLE, A. B. 1899. A systematic revision of the genus *Najas*. Trans. Linn. Soc. London, Bot. 5: 379-444.
SPRENGEL, C. 1825. *Caulinia*, p. 20. *In* Linneaus, C. Systema vegetabilium, vol. 1. Gottingae.
THIERET, J. W., R. R. HAYNES, and D. H. DIKE. 1969. *Blyxa aubertii* (Hydrocharitaceae) in Louisiana: New to North America. Sida 3: 343-344.
WENTZ, W. A. and R. R. HAYNES. 1973. Family 3B. Najadaceae. *In* Woodson, R. F., Jr. and R. W. Schery. Flora of Panama. Ann. Missouri Bot. Gard. 60: 1-5.
WENTZ, W. A. and R. L. STUCKEY. 1971. The changing distribution of the genus *Najas* (Najadaceae) in Ohio. Ohio J. Sci. 71: 292-302.
WILLIAMS, G. R. 1970. Investigations in the white waterlilies (*Nymphaea*) of Michigan. Michigan Bot. 9: 72-86.

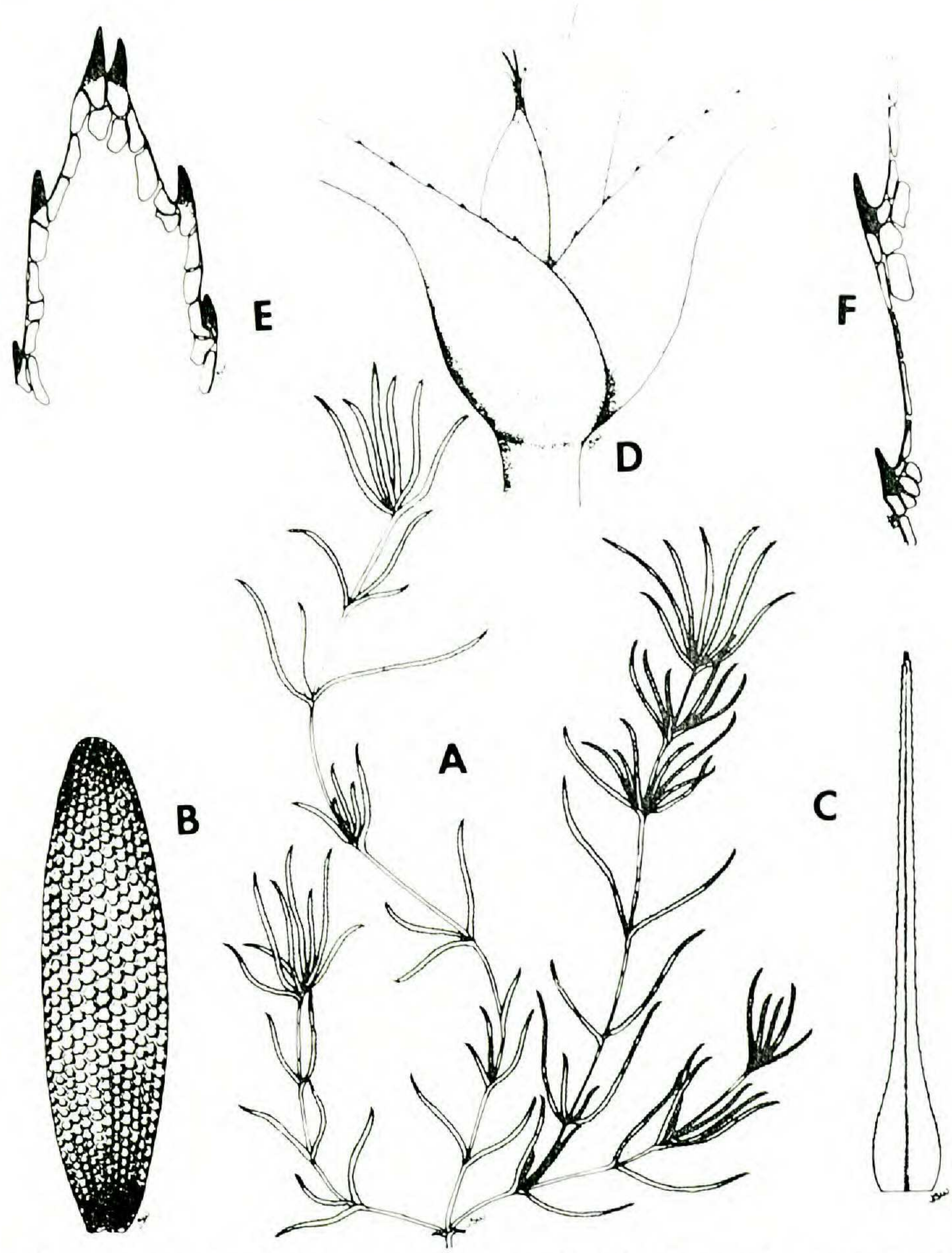

Fig. 3. *Najas guadalupensis* var. *floridana*. A. Habit sketch (× ¾); B. Fruit without involucre (× 25); C. Leaf (× 2½); D. Leaf axil with fruit (× 9); E. Leaf apex (× 30); F. Leaf margin (× 30).